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10/725,959	12/02/2003	Mathews J. Thundyil	5741	2834

44341 7590 11/14/2007  
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EXAMINER
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DRODGE, JOSEPH W

ART UNIT	PAPER NUMBER
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1797

MAIL DATE	DELIVERY MODE
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11/14/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/725,959

Applicant(s)

THUNDYIL ET AL.

Examiner

Joseph W. Drodge

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6,8-14,16,17,19,20,22-30 and 32-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13,14,16,17,19,20,22-29,33 and 34 is/are allowed.
- 6) ☒ Claim(s) 1-6,8-12,30 and 32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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The indicated allowability of claims 1,2,4,5 and 8-12, is withdrawn in view of further consideration of the teachings of newly cited Mrachko patent 5,968,812.

Claims 1-6 are 8-12 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims now recite "acid catalyzed liquid" as being the unwanted liquid being extracted for removal. However, on further review of the Instant Specification, it is realized that removal of "acid catalysts", not other materials that are acid catalyzed is the focus of the applicant's efforts (page 2, 1<sup>st</sup> sentence following "Background of the Invention" and last sentence of page 3, etc.). Thus the terminology "acid catalyzed" constitutes New Matter; apparently applicant's intended rather "acid catalysts".

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 30 is rejected under 35 U.S.C. 102(b) as being anticipated by Lizama et al patent 5,458,752. For independent claim 30, Lizama et al introduces an aqueous, polar, extraction liquid into a fluid (organic liquid) having an unwanted liquid constituent therein so as to form a physical emulsion comprising droplets under 10 microns in diameter that are dispersed or suspended in the fluid (column 5, lines 42-62); allows the droplets to interact by polar forces (the extraction liquid is water which is polar and immiscible with the organic liquid) to form

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microdroplets in a second process step/subjection to 2<sup>nd</sup> transient high-intensity electric field (column 5, lines 62-66), and capture/separate the microdroplets (by actions of biocatalysts, adsorption and desorption processes at fluid interfaces and by removal of phases from different outlets of the reaction chamber (column 4, lines 63-67, column 5, lines 18-21 and column 6, lines 32-43) and coalesce the microdispersed into larger droplets (column 5, line 66). The amounts/volumes of both introduced extraction liquid and organic liquid are controlled by computer (column 6, lines 46-49). For independent claim 30, the larger coalesced droplets may also be captured and thus separated (column 6, lines 32-43).

*For claim 30, Lizama is now interpreted as also disclosing initial mixing of the extraction liquid and organic liquid to form an emulsion or suspension simply by the recitation of introducing the droplets of aqueous polar phase into upper or lower region of the unwanted liquid (organic phase) by way of nozzles, tubes, hoses or similar devices (column 5, lines 22-41) along with introduction of organic phase through similar devices. Such mixing is considered a form of static mixing.*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1,2,4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lizama et al patent 5,458,752 in view of Mrachko patent 5,968,812. For independent claim 30, Lizama et al introduces an aqueous, polar, extraction liquid into a fluid (organic liquid) having an unwanted liquid constituent therein, so as to form a physical emulsion comprising droplets under 10 microns in diameter that are dispersed or suspended in the fluid (column 5, lines 42-62); allows the droplets to interact by polar forces (the extraction liquid is water which is polar and immiscible with the organic liquid) to form microdroplets in a second process step/subjected to 2<sup>nd</sup> transient high-intensity electric field (column 5, lines 62-66), and capture/separate the microdroplets (by actions of biocatalysts, adsorption and desorption

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processes at fluid interfaces and by removal of phases from different outlets of the reaction chamber (column 4, lines 63-67, column 5, lines 18-21 and column 6, lines 32-43) and coalesce the microdispersed into larger droplets (column 5, line 66). The amounts/volumes of both introduced extraction liquid and organic liquid are controlled by computer (column 6, lines 46-49). For independent claim 30, the larger coalesced droplets may also be captured and thus separated (column 6, lines 32-43).

*Lizama is now interpreted as also disclosing initial mixing of the extraction liquid and organic liquid to form an emulsion or suspension simply by the recitation of introducing the droplets of aqueous polar phase into upper or lower region of the unwanted liquid (organic phase) by way of nozzles, tubes, hoses or similar devices (column 5, lines 22-41) along with introduction of organic phase through similar devices.*

*These claims differ in requiring that the unwanted liquid is acid catalyzed. It is noted that one of the unwanted liquids extracted and removed in the Lizama process may be sulfinic acids that are removed from petroleum mixtures; with the process, in part, employing action of biocatalysts (column 9, Table 2). However, Mrachko teaches extraction and removal of sulfinic acids from petroleum mixtures utilizing combined action of biocatalysts and catalytically acting acids (Lewis acids), see especially 5, lines 3-13 and 23-40). The Mrachko process also employs solvents, solvent extraction steps and creation of emulsions and microemulsions (column 4, lines 24-40 and column 7, lines 28-34). Hence it would have been obvious to one of ordinary skill in the art to have modified the Lizama process, by acid catalyzing the sulfinic acids being removed, by employ of Lewis acid catalysts, as taught by Mrachko, in order to facilitate desulfination of the sulfinic acids and more complete removal*

***of the sulfinic acids and related contaminants of the petroleum. If necessary, the catalytic acid liquids, or the Lewis acids are also removed with the organic phase (column 7, lines 28-34 of Mrachko).***

For recitations in dependent claims not covered in the preceding paragraph, Lizama also discloses removal and recovery of liquid, and liquid, acidic species (column 9, especially Table 2), introduction of liquids of varied types into plural inlets of the reaction and contact chamber (column 4, lines 10-41, column 5, lines 17-40 and column 6, lines 46-48), downstream separators (figure 5 and corresponding text), co-current or counter-current flow (column 5, lines 5-12), outlets may be oriented vertically (figure 1) and/or horizontally (figure 4).

Claims 8-12 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lizama et al patent 5,458,752 in view of Mrachko patent 5,968,812 and further in view of Bayley et al British Patent 1,443,704. For independent claim 30, Lizama et al introduces an aqueous, polar, extraction liquid into a fluid (organic liquid) having an unwanted liquid constituent therein so as to form a physical emulsion comprising droplets under 10 microns in diameter that are dispersed or suspended in the fluid (column 5, lines 42-62); allows the droplets to interact by polar forces (the extraction liquid is water which is polar and immiscible with the organic liquid) to form microdroplets in a second process step/subject to 2<sup>nd</sup> transient high-intensity electric field (column 5, lines 62-66), and capture/separate the microdroplets (by actions of biocatalysts, adsorption and desorption processes at fluid interfaces and by removal of phases

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from different outlets of the reaction chamber (column 4, lines 63-67, column 5, lines 18-21 and column 6, lines 32-43) and coalesce the microdispersed into larger droplets (column 5, line 66). The amounts/volumes of both introduced extraction liquid and organic liquid are controlled by computer (column 6, lines 46-49). For independent claim 30, the larger coalesced droplets may also be captured and thus separated (column 6, lines 32-43).

*Lizuma is now interpreted as also disclosing initial mixing of the extraction liquid and organic liquid to form an emulsion or suspension simply by the recitation of introducing the droplets of aqueous polar phase into upper or lower region of the unwanted liquid (organic phase) by way of nozzles, tubes, hoses or similar devices (column 5, lines 22-41) along with introduction of organic phase through similar devices.*

*These claims differ in requiring that the unwanted liquid is acid catalyzed. It is noted that one of the unwanted liquids extracted and removed in the Lizuma process may be sulfinic acids that are removed from petroleum mixtures; with the process, in part, employing action of biocatalysts (column 9, Table 2). However, Mrachko teaches extraction and removal of sulfinic acids from petroleum mixtures utilizing combined action of biocatalysts and catalytically acting acids (Lewis acids), see especially 5, lines 3-13 and 23-40). The Mrachko process also employs solvents, solvent extraction steps and creation of emulsions and microemulsions (column 4, lines 24-40 and column 7, lines 28-34). Hence it would have been obvious to one of ordinary skill in the art to have modified the Lizuma process, by acid catalyzing the sulfinic acids being removed, by employ of Lewis acid catalysts, as taught by Mrachko, in order to facilitate desulfination of the sulfinic acids and more complete removal of the sulfinic acids and related contaminants of the petroleum. If necessary, the catalytic acid*



*liquids, or the Lewis acids are also removed with the organic phase (column 7, lines 28-34 of Mrachko).*

These claims all additionally differ in requiring the steps of capturing and coalescing of microdroplets to include capturing with a porous medium, which may constitute a liquid/liquid separation device. However, Bayley teaches to capture, separate and coalesce droplets of a dispersed emulsion using such liquid/liquid, porous medium, comprising separation device (see especially page 1, lines 30-93 etc.). It would have been obvious to one of ordinary skill in the art to have modified the Lizama process by utilizing the porous liquid/liquid separation device of Bayley in the process, so as to increase the capacity of the separator, increase the separation rate of the dispersion and increase the inventory of mixtures that can be processed while minimizing the required size of the processing system. Bayley is pertinent to separation processes involving dispersed phases containing small droplets (page 5, lines 84-105).

For dependent claims rejected over the combination of Lizama and Bayley, Bayley teaches the coalescing and separation medium being of varied orientations and labyrinth formations and configurations (page 3, lines 23-28 and lines 79-104, page 4, lines 70-83). The medium may be oriented vertically (figure 2) or horizontally when applied in a series of stages (page 5, lines 27-61).

ALLOWABLE SUBJECT MATTER

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Claims 3 and 6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

These claims are all now distinguished in view of recitation of the liquid or fluid being processed comprising silicone fluid.

Lizama et al and related Scott et al patent 5,358,614 are specific to processes concerning treating petroleum products with biocatalysts or removal of constituents from bulk organic liquids using biocatalysts, specifically. Hence, neither Lizama or Scott et al processes are amenable to treatment of silicone-containing fluid streams.

The formerly applied teaching references pertaining to treatment of silicone streams do not suggest processes utilizing biocatalysts. The independent claims as now amended also all distinguish over Bayley et al in view of respective recitations of forming a plurality of extraction liquid droplets, already of the recited small size of being under 10 micron diameters, followed by forming of a plurality of microdroplets, before coalescing to form larger droplets.

Claims 13,14,16,17,19,20,22-29,33 and 34 are now all distinguished over the prior art. These claims are all now distinguished in view of recitation of the liquid or fluid being processed comprising silicone fluid.

Lizama et al and related Scott et al patent 5,358,614 are specific to processes concerning treating petroleum products with biocatalysts or removal of constituents from bulk organic liquids using biocatalysts, specifically. Hence, neither Lizama or Scott et al processes are amenable to treatment of silicone-containing fluid streams.

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Newly cited Geek et al patent 5,401,821 and Weidner et al patent 5,548,053 both concern removal of the acid catalyst liquids from synthesis of silicone products, however by processes employing distillation and filtration. In particular, Geek teaches away from employ of liquid/liquid solvent extraction processes such as employed in Lizama (see column 8, lines 36-39).

The formerly applied teaching references pertaining to treatment of silicone streams do not suggest processes utilizing biocatalysts. The independent claims as now amended also all distinguish over Bayley et al in view of respective recitations of forming a plurality of extraction liquid droplets, already of the recited small size of being under 10 micron diameters, followed by forming of a plurality of microdroplets, before coalescing to form larger droplets.

*Applicant's arguments filed on October 4, 2007, to the extent they remain germane, have been fully considered but they are not persuasive.*

*It is argued that Lizama does not concern acid liquid catalysts or acid catalyzed materials, however newly cited Mrachko explicitly teaches such in a process closely related to that of Lizama.*

*With respect to claim 30, it is argued that Lizama or other references do not discuss such mixing or agitation. However, Lizama is now interpreted as also disclosing initial mixing of the extraction liquid and organic liquid to form an emulsion or suspension simply by the recitation of introducing the droplets of aqueous polar phase into upper or lower region of the unwanted liquid (organic phase) by way of nozzles, tubes, hoses or similar devices (column 5, lines 22-41) along with introduction of organic phase through similar devices. To clarify, such introduction step characterizes a form of static mixing.*

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Further regarding claim 30 and regarding other claims, it is argued that Lizama does not disclose a specific gravity difference "of as low as 0.01" between the aqueous and organic phases. It is submitted that "as low as" is interpreted to mean any value of 0.01 or greater!


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Drodge at telephone number 571-272-1140. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Roy Sample, can be reached at 571-272-1376. The fax phone number for the examining group where this application is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either private PAIR or Public PAIR, and through Private PAIR only for unpublished applications. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have any questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JWD

November 12, 2007

  
JOSEPH DRODGE  
PRIMARY EXAMINER